

# THE CONSTRUCTION OF OPTIMUM PORTFOLIO USING SHARPE'S INDEX MODEL—A STUDY WITH REFERENCE TO SELECTED COMPANIES OF BSE SENSEX

**Dr. ABBOKAR SIDDIQ<sup>1</sup>, AYHAM AL-MOMANI<sup>2</sup>, EBRAHIM AL-GAMAL<sup>3</sup>  
& MOHAMMED QASABAH<sup>4</sup>**

<sup>1,3,4</sup>University College, Mangalore University, Karnataka, India

<sup>2</sup>Mahajana Education Center, Mysore University, Karnataka, India

## ABSTRACT

*Individual invest their money both emotionally and as well as rationally. An investor considered investment in portfolios is facing a problem of choosing a good security among a various securities in a secure market. Some rare investors are investing their amount in a single security. But most of the investors invest their funds in the group of securities instead of investing in a single security. It helps to reduce the risk of investors. The main objectives of any investors in stock market are to maximize the return with minimum risk. This study is taken up for the construction of optimum portfolio using Sharpe's index model for 10 selected companies from 5 different sectors for 2 year period from January 2015 to December 2016, and out of these selected companies only 2 companies (Biocon & Markasn) were selected for the construction of optimum portfolio.*

**KEYWORDS:** Stock Market, Optimum Portfolio & BSE Sensex

**Received:** Jan 28, 2019; **Accepted:** Feb 18, 2019; **Published:** Aug 05, 2019; **Paper Id.:** IJECRDEC20192

## 1. INTRODUCTION

Investment refers to the employment of funds on assets with the aim of increasing the income and capital. An investor invests his amount in a securities for the purpose of expecting to get a maximum returns along with minimum risk. Investors are faced with a problem of choosing a better security from among large number of securities so they are selecting the portfolio depending upon their objectives.

The investors required a lot of scientific and analytical skill in order to invest their funds in securities in the capital market and constructions of optimum portfolio. There are two methods for constructions of optimum portfolio, which are the Traditional method - which based on the capital appreciation, liquidity, safety, earning of incomes etc- and Modern method- which based of the combinations of Markowitz model, Sharpe index model, and CAPM model.

William Sharp developed the Sharp model in 1966, and it is used to measure and compare the level of risk on the portfolio, which indicate that the higher the Sharpe ratio, the better the performance of the portfolio. Sharp models show two things: first, if the investor's strategy makes a bigger profit compared to a risk-free rate; and second, it links the investor's profits to the amount of risk they are exposed to.

Bombay stock exchange (BSE) was established in the year 1875 it is the first stock exchange in Asia. It trades the equity, debt instructions, derivatives, and mutual funds. It trades efficiently and

transparent in the market. It is one of the leading stock exchanges in India. More than 5000 companies are listed under the BSE.

## 2. REVIEW OF LITERATURE

Algamal & Siddiq (2017) studied risk and return factors of selected banks in Bombay stock exchange, with main objectives to examine the efficiency of CAPM and other risk in Bombay stock exchange. The result of the study shown that banks with higher return would face lower beta then lower risk, as well as the bank, which have lower return, would face higher beta then higher risk.

Poornima & Remesh (2015) - the main aim of this study is to construct an optimal portfolio using Sharpe's Single Index model. For this purpose monthly closing prices of 10 companies from the banking sector and 10 companies from IT sector listed in the Bombay stock exchange (BSE) were selected. Share prices for the period of January 2010 to December 2015 had been considered. Using all the collected data a "cut-off" rate had been calculated and that rate had been considered for the construction of optimal portfolio. The finding of the study is very useful for investors, policy makers, corporations and their financial market participants.

Kapil Sen & CaDisha Fattawat, (2014) studied Sharpe's single index model and its application portfolio construction. The study reveals that the construction of optimal portfolio investment by using Sharpe's single index model.

Nalini, (2014) study is aimed at creating awareness in the minds of investors regarding the utility of Sharpe's Single Index Model in portfolio construction. The Indian investors also may reap the benefits of Sharpe's Single Index Model (SIM) as the number of companies traded in the stock exchanges is increasing year after year. Fifteen companies from the S&P BSE Sensex index were selected for the study.

Arunkumar, (2013) – based on these models, we compute the portfolio return and its characteristics. A portfolio optimization is only possible once we have a model of the portfolio return. Therefore the aim of the model is to control the financial risk that an investor takes.

Alka Rani, (2012) said this research paper is an academic exposition into the modern portfolio theory (MPT) written with a primary objective of showing how it aids an investor to classify, estimate, and control both the kind and the amount of expected risk and return in an attempt to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return. A methodology section is included which examined the applicability of the theory to real time investment decisions relative to the assumptions of the MPT. A fair critique of the MPT is carried out to determine inherent flaws of the theory while attempting to proffer areas of further improvement (for example, the post-modern portfolio theory [PMPT]). The paper is summarized to give a compressed view of the discourse upon which conclusions were drawn while referencing cited literature as employed in the course of the presentation.

## 3. OBJECTIVES OF THE STUDY

The main purpose of this study is to construct of optimum portfolio using Sharpe's Index model, to analyze risk and return factors of selected companies stock, and to know the expected returns, movements of share prices, beta values and standard deviation of the selected companies stock.

## 4. RESEARCH METHODOLOGY

### 4.1 Research and Sampling Design

Descriptive research design is used for data analysis.

**Table 1**

Industry/Sectors	Company
Pharma Sector	<ul style="list-style-type: none"> <li>MARKSANS PHARMA Ltd</li> <li>BIOCON Ltd</li> </ul>
Bank Sector	<ul style="list-style-type: none"> <li>HDFC BANK</li> <li>YES BANK</li> </ul>
IT Sector	<ul style="list-style-type: none"> <li>INFOSYS Ltd</li> <li>HEXAWARE TECHNOLOGIES Ltd</li> </ul>
FMCG Sector	<ul style="list-style-type: none"> <li>HINDUSTAN UNILEVER Ltd (HUL)</li> <li>DABUR INDIA Ltd</li> </ul>
Auto Mobile Sector	<ul style="list-style-type: none"> <li>HERO MOTOCORP Ltd</li> <li>EICHER MOTORS Ltd</li> </ul>

Source: developed by researchers

### 4.2 Data Collection and Tools Used

Secondary data has been collected from different sources like websites, newspapers, books, and journals and inter connected stock exchanges etc.

The Sharpe model has been used for the data analysis to help to select the appropriate securities in a portfolio.

## 5. DATA ANALYSIS

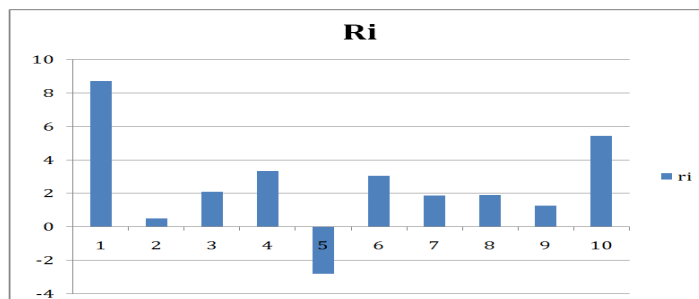
Data from Bombay stock exchange (BSE) has been collected for the prices of the security of selected companies from different sectors for the period of 24 months from January 2015 to December 2016, and it has been collected for purpose of construction of optimum portfolio through this below formulas to calculate the return, market return, beta and unsystematic return:

$$R_i = \frac{\sum R_i}{N} \quad R_m = \frac{\sum R_m}{N} \quad \sigma_i^2 = \frac{(\bar{R}_i - R_i)^2}{N-1} \quad \sigma_i^2 = \frac{\sum (R_m - R_m)^2}{N-1}$$

$$\beta_i = \frac{\sum (\bar{R}_i - R_i)(\bar{R}_m - R_m)}{(\bar{R}_m - R_m)^2}$$

$$\sigma_{ei}^2 = \sigma_i^2 - \beta_i^2 * \sigma_m^2$$

Market return = Today price - yesterday price / Yesterday price



**Graph 1: Graph Showing the Each Returns of the Company for the Year 2015-2016**

**Table 2: Showing Expected Returns, Variance, Standard Divination, Unsystematic Risk and Beta Values for Security for the Year 2015-2016**

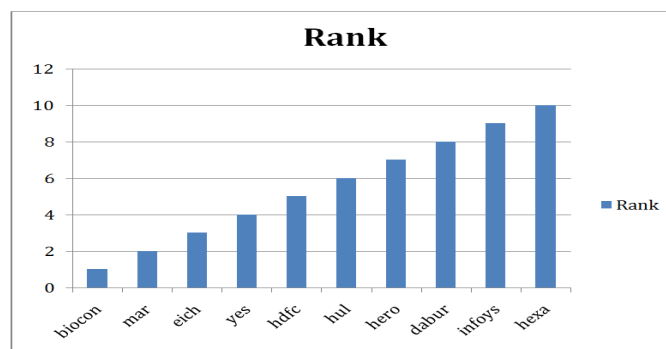
Company	Ri	$\sigma^2$	sd	$\beta$	$\sigma_{ei}^2$
MARKSAN	8.7054	0.044707	0.211440	1.5091	0.04354
BIOCON	0.4841	0.005474	0.073986	-0.1456	0.005683
HDFC BANK	2.067	0.002725	0.05220	1.0984	0.001196
YES BANK	3.3322	0.014527	0.120528	2.242	0.008294
Infosys	-2.829	0.027279	0.165163	1.3013	0.026153
HEXAWARE LTD	3.0402	0.011827	0.108752	0.4831	0.012023
HUL	1.8466	0.0043842	0.066213	1.0712	0.003008
DABUR	1.8774	0.002313	0.048093	0.7812	0.00158
HERO MOTOCORP	1.2645	0.005230	0.072318	1.1237	0.003733
EICHER	5.4049	0.009258	0.096318	1.5784	0.006258

**Table 3: Table Showing Excess Return, Beta Ratio and Ranks for the Year 2015-2016**

Securities	Ri	B	$(R_i - R_f)/\beta$	Rank
MARKSAN	8.7054	1.5091	0.417732	2
BIOCON	0.4841	-0.1456	52.1353	1
HDFC BANK	2.067	1.0984	-5.46977	5
YES BANK	3.3322	2.242	-2.11543	4
INFOSYS	-2.829	1.3013	-8.37931	9
HEXAWARE	3.0402	0.4831	-10.4219	10
HUL	1.8466	1.0712	-5.81441	6
DABUR	1.8774	0.7812	-7.93344	8
HERO MOTOCROP	1.2645	1.1237	-6.06078	7
EICHER	5.4049	1.5784	-1.69165	3

**Table 4: Table Showing a Series of Ranks for the Year 2015-2016**

Securities	Ri	Rf	$\beta$	$\sigma_{ei}^2$	Rank
BIOCON	0.4841	8.075	-0.1456	0.005683	1
MARKSAN	8.7054	8.075	1.5091	0.04354	2
EICHER	5.4049	8.075	1.5784	0.006258	3
YES BANK	3.3322	8.075	2.242	0.008294	4
HDFC	2.067	8.075	1.0984	0.001196	5
HUL	1.8466	8.075	1.0712	0.003008	6
HERO MOTOCROP	1.2645	8.075	1.1237	0.003733	7
DABUR	1.8774	8.075	0.7812	0.00158	8
INFOYS	-2.829	8.075	1.3013	0.026153	9
HEXAWARE	3.0402	8.075	0.4831	0.012023	10

**Graph 2: Graph showing series of Ranked Securities for the Year 2015-2016**

Calculation of cut off rate for all the securities according to the ranked order using the below formula

$$Ci = \frac{(\sigma m 2 \Sigma (Ri - Rf) \beta i)}{(\sigma ei 2)(1 + \sigma m 2 \Sigma \beta i)}$$

**Table 5: Table showing cut-off Rate for all Securities for the Year 2015-2016**

COMPANY	(Ri-Rf)/β	((Ri-Rf)/β)/SDE	CUM	β^2/SDE^2	CUM	CI
MARKSSAN	-4.442	-729.137	-729.137	6.719	6.719	-0.354
BIOCON	-6.886	-3078.423	-3807.559	6.295	13.014	-0.312
HDFC BANK	-8.809	-5313.968	-9121.528	6.213	19.227	-0.339
INFOSYS	-7.599	-7.599	-9129.126	6.331	25.558	-0.367
YES BANK	-7.475	-3469.752	-12598.878	6.284	31.842	-0.332
HEXAEEAWRE	-7.900	-3763.129	-16362.007	6.277	38.119	-0.346
HINDUSTAN UNILEVER	-9.328	-5971.186	-22333.192	6.199	44.318	-0.348
DABUR	-8.699	-5095.224	-27428.416	6.221	50.538	-0.341
HERO	-8.173	-4257.105	-31685.522	6.252	56.790	-0.341
EICHER	-7.716	-3789.140	-35474.662	6.268	63.058	-0.332

## 6. CONCLUSION AND FINDINGS

Out of the scrip selected for the study *MARKSSAN* Company has highest return of 8.0754 along with high beta value of 1.5091. In the Banking sector *Yes Bank* has a moderate return of 3.3322 along with high beta value of 2.2420. Out of the scrip average return of Infosys has a negative value of -2.829. It indicates that the return for the period is low. The *DABUR* Company has less beta value of 0.7812 and it has a moderate return of 1.8774. In the Auto mobile sector *HEXAWARE* Company has less return of 1.2645. Because the returns are fluctuating month to month. Since *BIOCON* Company reflects higher return proportion of 99.05 in the construction of portfolio. Out of the scrip selected for the study the *HUL Company* has moderate return of 1.8466 with high risk of 1.0712. *EICHER* Company performing well its rate of return is 5.4049 along with high risk of 1.5784.

Using Sharpe's index model the firms are ranked from largest to lowest. The companies are ranked based on the excess return to beta. In this chart *BIOCON* got first rank and *HEX AWARE* Company got last rank.

The companies, which suggest investing under the portfolio selection of stocks among the 10 firms, are *MARKSSAN* and *BIOCON*.

## REFERENCES

1. Alka Rani (2012). *The Modern Portfolio Theory As An Investment Decision Tool International Journal Of Management Research And Review*. 2(7) 1164-1172.
2. Arun Kumar (2013). *A Study on Construction of Optimal Portfolio Using Sharpe's Single Index Model*.3(41).
3. Barough, A. S., Shoubi, M. V., & Preece, C. N. (2013). *Evaluating the effectiveness of mediation and arbitration processes in resolving disputes in the Malaysian construction industry. International Journal of Civil Engineering (IJCE) Vol, 2, 21-28.*
4. Ebrahim Al-Gamal&Abbokarsiddiq (2017) *study on risk and return factors of selected banks in Bombay stock exchange (BSE), international journal of trend in scientific research and development, issue-3, 2456-6470*
5. Nalini 2014. *Optimal Portfolio Construction Using Sharpe's Single Index Model: A Study of Selected Stocks from BSE, International Journal of Advanced Research in Management and Social Sciences*. 3(12), 72-93.

6. Loganina, V. I., Makarova, L. V., Tarasov, R. V., & Sergeeva, K. (2013). *Dry Construction Mixtures with Composite Lime Astringent*.
7. KapilSen&CaDishaFattawat(2014). *Sharpe's single index model and its application portfolio construction, an empirical study – Global journal of finance and management*. 6 (6), 511-516.
8. S Poornima, Aruna P Remesh (2015). *Construction of optimal portfolio using Sharpe's single index model: A study with reference to banking & IT sector. International Journal of Applied Research*. 1(13), 21-24.
9. Prabhu, P. G., & Ambika, D. (2013). *Study on behaviour of workers in construction industry to improve production efficiency. International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development*, 3(1), 59-66.
10. [www.bseindia.com](http://www.bseindia.com)
11. [www.moneycontrols](http://www.moneycontrols)
12. [www.nseindia.com](http://www.nseindia.com)